CLAIM OR CLAIMS

1. In a fuel cell stack assembly having a plurality of plates with grooves for accommodating gaskets to provide seals between individual fuel cell plates in the fuel cell stack assembly in order to prevent leakage of gases and liquids required for operation of the fuel cell stack assembly, the improvement comprising grooves in each fuel cell plate in the fuel cell stack assembly with a circular or an elliptical profile, and a gasket of a sealing material between each fuel cell plate in the fuel cell stack assembly having a profile corresponding to the profile of the grooves in each fuel cell plate.

2. A fuel cell stack assembly according to Claim 1 in which an adhesive is applied to the surface of the grooves or an adhesive is included as a component of the sealing material for adhering the gaskets in the grooves.

3. A fuel cell stack assembly according to Claim 2 in which the gasket includes at least one upstanding bead extending along its surface for improving sealing relationship between fuel cell plates in the fuel cell stack assembly.

4. A fuel cell stack assembly according to Claim 1 in which the gasket comprises a sealing material which is a curable sealing material containing:

(a) 100 parts by weight of a polydiorganosiloxane containing two or more silicon atom bonded alkenyl groups in each molecule;

(b) 5-50 parts by weight of a reinforcing filler;

(c) 1-20 parts by weight of an oxide or hydroxide of an alkaline earth metal with an atomic weight of 40 or greater;

(d) an organohydrogensiloxane containing three or more silicon atom bonded hydrogen atoms in each molecule, the hydrogen atoms being present in an amount providing a molar ratio of silicon atom bonded hydrogen atoms in component (d) to silicon atom bonded alkenyl groups in component (a) in a range of 0.4:1 to 5:1; and

(e) a platinum type metal catalyst in an amount providing 0.1-500 parts by weight of platinum type metal per one million parts by weight of component (a).

5. A fuel cell stack assembly according to Claim 4 wherein the sealing material further comprises:

(f) 0.1-5.0 parts by weight of an organic peroxide in combination with component (e) or in place of component (e);

(g) 0.01–5.0 parts by weight of an inhibitor; and

(h) 0.01-100 parts by weight of a non-reinforcing extending filler.

6. A fuel cell stack assembly according to Claim 4 wherein the polydiorganosiloxane of component (a) is a vinyl terminated polydimethylsiloxane having a viscosity of at least 55 Pa•s (55,000 cP) or a blend of lower and higher viscosity vinyl containing polydimethylsiloxanes such that the viscosity of the blend is at least 55 Pa•s (55,000 cP).

7. A fuel cell stack assembly according to Claim 4 wherein component (a) is a vinyl terminated methyltrifluoropropylsiloxane dimethylsiloxane copolymer in which the mole percent of methyltrifluoropropyl is 10-100 mole percent.

8. A fuel cell stack assembly according to Claim 4 wherein component (a) is a vinyl terminated diphenylsiloxane dimethylsiloxane copolymer in which the mole percent of diphenylsiloxane is 2-50 mole percent.

9. A fuel cell stack assembly according to Claim 4 wherein component (e) is encapsulated in a thermoplastic organic polymer.

10. A fuel cell stack assembly according to Claim 4 wherein component (e) is an organic peroxide instead of a platinum type metal catalyst, and it is present in an amount of 0.5-5.0 parts per 100 parts of the sealing material, and the sealing material is cured by heating it to a temperature of 100-200 °C.

11. A fuel cell stack assembly according to Claim 4 wherein the curable sealing material further comprises:

(i) 0.1-20 parts by weight of an adhesion promoter, the adhesion promoter being an epoxy containing organosilicon compound, the adhesion promoter being added to the curable sealing material before it is cured.